REMARKS

This Amendment responds to the Office Action dated April 28, 2004 in which the Examiner rejected claims 1-20 under 35 U.S.C. §103.

Claim 1 claims an injection mould producing three-dimensional components and claim 8 claims a system for mould tempering of injection moulds for producing three-dimensional components. The injection mould and system therefor comprise at least one groove that extends between two points in an arbitrary volume of the mould around a cavity. The groove conducts a tempering medium for tempering of modules included in the mould. The groove extends between the two points along a path having a shape designed according to the shape of the cavity and according to locations of one or more components for performing integrated functions in order to increase or decrease a rate of heat transfer from the mould to the tempering medium at different positions along a length of the groove. Each groove is covered along essentially its entire extent by a cover.

Through the structure of the claimed invention for an injection mould producing three-dimensional components and having a groove having a shape designed in order to increase and decrease a rate of heat transfer at different positions along the length of the groove, as claimed in claims 1 and 8, the claimed invention provides an injection mould and system therefor which adjusts the mould tempering directly to the geometry of the components within the mould. The prior art does not show, teach or suggest the invention as claimed in claims 1 and 8.

Claims 1, 2, 4-9, 11, 13, 15, 17 and 19 were rejected under 35 U.S.C. § 103 as being unpatentable over *Shida et al* (U.S. Publication No. 2001/0026817) in view of *Nakashima et al* (U.S. Patent No. 5,207,266).

Applicant respectfully traverses the Examiner's rejection of the claims under 35 U.S.C. § 103. The claims have been reviewed in light of the Office Action, and for reasons which will be set forth below, applicant respectfully requests the Examiner withdraws the rejection to the claims and allows the claims to issue.

Shida et al appears to disclose [0002] a mold for injection molding which is used at the time of injection molding the disc substrate of an optical disc. [0006] FIG. 4 is a sectional view showing the schematic diagram of a mold K0 of the injection molding apparatus which molds the disc substrate of a CD. As shown in this figure, such mold K0 of the conventional apparatus includes a pair of a fixed mold body 101 and a movable mold body 102. [0008] The fixed mold body 101 includes a fixed mold mirror surface board 106 of a disc shape which forms one surface of the disc substrate to be molded, and is fixed by means of a screw etc. to a not-shown fixed side die plate of the main body of the injection molding apparatus through an attachment mold board 107. A tubular spool bush 108 is passed through the fixed mold mirror surface board106 and inserted in the center portion within the fixed mold mirror surface board 106. A spool 109 for conducting the molding material to the mold space 105 is provided within the spool bush 108. [0009] The movable mold body 102 is provided with a board of a disc shape having the other surface of the disc substrate to be molded, that is, the surface to which a stamper 110 for forming pits carrying recording information is attached. [0010] As shown in FIG. 4, coolant grooves are provided within each of the movable mold mirror surface board 111 and the fixed mold mirror surface board 106.

Thus, *Shida et al* merely discloses a plurality of cooling grooves provided in a movable mold mirror surface board 111. Nothing in *Shida et al* shows, teaches or

suggests a) a groove having a shape designed according to shape of the cavity and according to locations of one or more components for performing integrated functions or b) that the shape is designed in order to increase and decrease the rate of heat transfer at different positions along the length of the groove as claimed in claims 1 and 8. Rather, *Shida et al* merely discloses a plurality of cooling grooves.

Additionally, *Shida et al* merely discloses molding a disc (i.e. a two-dimensional object). However, as claimed in claims 1 and 8 three-dimensional components are produced.

Nakashima et al appears to disclose a water cooled-copper casting mold comprising a copper plate as a body of a casting mold and a back frame which is fastened to the copper plate, in which widths of main channels are wider than those in other regions. (col. 1, lines 6-10) Bolts are fastened at given intervals to prevent water from leaking from the channels. There was such a problem in the conventional structure that intervals between the slits at the bolt fastening regions X were wider than other regions Y since the formation of the channels were restricted due to the existence of the bolts, as illustrated in FIGS. 3 and 4. As a result, the cooling effect was deteriorated. To solve this problem, there is proposed a means as illustrated in FIGS. 5 and 6, in which increased channels 2b are formed at the central portion between main channels 2a excluding bolt screwing holes 5a and branch channels 2d are provided between the main channels 2a and the increased channels 2b. However, the mere increase of the slits increase sectional areas of the channels but reduce the velocity of a running cooled water (hereinafter referred to as water velocity), which results in reduction of the cooling effect). FIG. 1 shows a plan view explaining the formation of the slit 2 on the copper plate 1. The water-cooled

copper casting mold comprises the copper plate 1 having the slits 2 which are provided inside thereof and a back frame 3 is fastened by the bolt 5 at the inside of the copper plate 1. An O-ring 4 is interposed between the copper plate 1 and the back frame 3 for preventing the water from leaking therefrom. In the region X, the main channels 2a, 2a are provided so as to interpose the bolt screwing holes 5a, 5a, 5a therebetween and the branching portions 2c are formed widely at both ends and the central portions of the main channels 2a, 2a, i.e. at the portions close to the bolt screwing holes 5a. Increased channels 2b are provided at the central portion between the main channels 2a and 2a and between the adjoining bolt screwing holes 5a and 5a and extend disposed in parallel with the main channels 2a. Branch channels 2d extend from the branching portion 2c to the increased channels 2b and have deep thickness. (col. 3, lines 4-32) Since at least ones of the branch channels and branching portions where the main channels and the branch channels merge with each other have larger sectional areas than those of the main channels and the increased channels, it is possible to prevent the amount of cooling water and the water velocity from reducing, thereby performing the uniform cooling function. (col. 5, lines 3-10)

Thus, *Nakashima et al* merely discloses a water cooled-upper casting mold. However, as claimed in claims 1 and 8, injection moulding for producing three-dimensional components is claimed. Applicant respectfully points out to the Examiner that casting is used for metals, whereas injection moulding is used for plastics.

Also, *Nakashima et al* merely discloses performing a uniform cooling function by having larger sectional areas where channels merge with each other to prevent

cooling water velocity from reducing. Nothing in *Nakashima et al* shows, teaches or suggests a) designing a shape of a groove according to the shape of the cavity and according to locations of one or more components for performing integrated functions or b) designing the shape of a groove in order to increase and decrease a rate of heat transfer at different positions along a length of a groove as claimed in claims 1 and 8. Rather, *Nakashima et al* merely discloses increasing the sectional areas of channels where channels merge in order to have a uniform cooling function.

The combination of *Shida et al* and *Nakashima et al* would not be possible since *Shida et al* is directed to two-dimensional injection molding while *Nakashima et al* is directed to metal casting. Even assuming arguments that the references could be combined, the combination would merely suggest to replace the plurality of coolant grooves in *Shida et al* with the copper casting mold of *Nakashima et al*. Thus nothing in the combination of the references shows, teaches or suggests a) a groove having a shape designed according to the shape of the cavity and according to locations of one or more components for performing integrated functions and b) designing a shape in order to increase and decrease a rate of heat transfer at different positions along a length of the groove as claimed in claims 1 and 8. Therefore, applicant respectfully requests the Examiner withdraws the rejection to claims 1 and 8 under 35 U.S.C. § 103.

Claims 2, 4-7, 9, 11, 13, 15, 17 and 19 depend from claim 1 and recite additional features. Applicant respectfully submits that claims 2, 4-7, 9, 11, 13, 15, 17 and 19 would not have been obvious within the meaning of 35 U.S.C. § 103 over *Shida et al* and *Nakashima et al* at least for the reasons as set forth above.

Therefore, applicant respectfully requests the Examiner withdraws the rejection to claims 2, 4-7, 9, 11, 13, 15, 17 and 19 under 35 U.S.C. § 103.

Claims 3, 10, 12, 14, 16, 18 and 20 were rejected under 35 U.S.C. § 103 as being unpatentable over *Shida et al* in view of *Nakashima et al* and further in view of Takahashi (U.S. Patent No. 5,783,233).

Applicant respectfully traverses the Examiner's rejection of the claims under 35 U.S.C. § 103. The claims have been reviewed in light of the Office Action, and for reasons which will be set forth below, applicant respectfully requests the Examiner withdraws the rejection to the claims and allows the claims to issue

As discussed above, since nothing in the combination of the primary references of *Shida et al* and *Nakashima et al* shows, teaches or suggests the primary features as claimed in claims 1 and 8, applicant respectfully submits that the combination of the primary references with the secondary reference to *Takahashi* would not overcome the deficiencies of the primary references. Therefore, applicant respectfully requests the Examiner withdraws the rejection to claims 3, 10, 12, 14, 16, 18 and 20 under 35 U.S.C. § 103.

As indicated above, new claims 21-22 have been added. Applicant respectfully submits that these claims are also in condition for allowance.

Thus it now appears that the application is in condition for reconsideration and allowance. Reconsideration and allowance at an early date are respectfully requested.

If for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is requested to contact, by telephone, the applicant's

undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed within the currently set shortened statutory period, applicant respectfully petitions for an appropriate extension of time. The fees for such extension of time may be charged to our Deposit Account No. 02-4800.

In the event that any additional fees are due with this paper, please charge our Deposit Account No. 02-4800.

Respectfully submitted,

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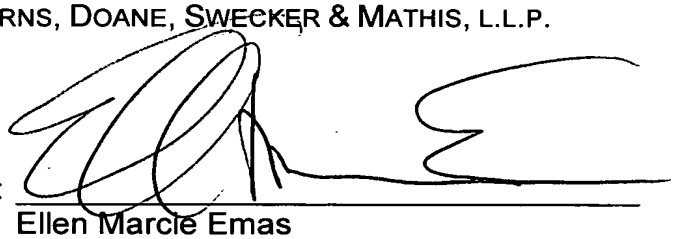

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